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**Quality management - Guideline for customer-oriented  
innovation cycle**

质量管理 基于顾客需求引领的创新循环指南

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## Introduction

### 0.1 General

This Standard aims to help organizations that have established a relatively complete quality management system implement a cyclic quality technology innovation management model in which “customer needs orient test technology innovation, test technology innovation drives failure mechanism analysis, and process system optimization achieves quality technology innovation.” The main features are as follows:

- a) Emphasize customer orientation, fully identify the key needs of customers from three aspects: understanding customer needs, mastering customer complaints, and measuring customer satisfaction, and use this to lead the continuous cycle of the four links to achieve continuous quality technology innovation.
- b) Strengthen the role of test, carry out test technology innovation based on customer needs, quickly isolate products that do not meet customer needs, and combine failure mechanism analysis of products that do not meet customer needs, to further implement source prevention and control, and promote technology innovation and management improvement in the R&D, procurement, manufacturing, and sales and service processes.
- c) Pay attention to the failure mechanism analysis. For customer complaints and inspections of products that do not meet customer needs, the failure mechanisms must be analyzed and determined, and potential risks must be comprehensively identified from the R&D, procurement, manufacturing and sales and service processes.
- d) Implement full process system optimization, and use standard improvement or the R&D and application of supporting software and hardware as the output of quality technology innovation to ensure long-term implementation of innovation.

The main benefits of organizations implementing a quality technology innovation cycle in accordance with this Standard are:

- a) Respond quickly to customer needs and improve the organization’s ability to meet customer needs;
- b) Solve quality problems scientifically, timely and systematically, and accumulate knowledge;
- c) Continuously improve the quality technology level and quality management level of the organization;
- d) Help the organization improve its overall performance and promote sustainable development.

# Quality management - Guideline for customer-oriented innovation cycle

## 1 Scope

This Standard provides the steps, methods and implementation guidelines for organizations to carry out quality technology innovation cycles.

This Standard applies to manufacturing organizations that strive for excellence.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 19000, Quality management systems - Fundamentals and vocabulary

## 3 Terms and definitions

Terms and definitions determined by GB/T 19000, as well as the following, are applicable to this document.

### 3.1

#### **quality technology innovation**

Activities that apply new or improved technologies to quality practices.

**Note:** Quality technology innovation in this Standard is mainly reflected in the improvement of technical standards and administrative standards, as well as the research, development and application of supporting software and hardware (including information systems that support each process, as well as automation equipment, tools, tooling and other hardware that support the entire process).

### 3.2

#### **reverse driver cycle**

Repetitive process of deriving a specific implementation method through objectives, and then continuously improving the objective after it is achieved.

#### **4.4 Failure mechanism analysis**

Build a failure analysis platform, use professional technology and quality tools to conduct in-depth research on the failure cause of products or parts that do not meet customer needs, and systematically identify potential risks throughout the entire process.

#### **4.5 Process system optimization**

Based on the rapid improvement of failure mechanisms, in combination with the systematic improvement of potential risks throughout the process, achieve quality technology innovation through the improvement of technical standards and administrative standards based on test standards, charts, and design requirements, as well as the R&D and application of supporting software and hardware.

### **5 Customer orientation**

#### **5.1 General**

Clarify customer needs and convert them into product requirements by understanding customer needs, analyzing customer complaints, and conducting customer satisfaction measurements.

#### **5.2 Understanding customer needs**

##### **5.2.1 Directly obtaining customer information**

Understand the needs and expectations of different customer groups, as well as their priorities, through questionnaire surveys, customer interviews and other methods. Customer needs and expectations include product features, reliability, cost performance, delivery cycle, after-sales service, technical support, etc. Use different survey methods, according to the actual situation, for different customer groups.

##### **5.2.2 Indirectly obtaining customer information**

Use Internet technology to obtain changing trends in customer consumption needs from the Internet, media, scientific research results, etc., and utilize its own operating network system to obtain relevant information on consumer needs and expectations from government platforms, markets, relevant industry associations, dealers, maintenance service providers and other channels. When obtaining information, consideration shall be given to the authenticity of the information and screening shall be carried out in the aspects of authoritativeness, popularity, reputation, etc. of the information source.

#### **5.3 Analyzing customer complaints**

##### **5.3.1 Complaint response**

The organization should establish an effective way to collect customer complaints so that all complainants can easily implement it and obtain detailed information about complaints and resolution of complaints. When handling complaints, the organization's processes and supporting information shall be easy to understand and use, and the information shall be clearly expressed. Complaint information shall be classified and processed according to the urgency.

### **5.3.2 Professional division of labor**

A series of trans-department teams within the organization can be established according to a clear professional division of labor to quickly classify, analyze and handle customer complaint information.

### **5.3.3 Complaint analysis**

Use statistical analysis technology, such as large text analysis technology, through word segmentation processing, word frequency analysis, semantic network analysis, etc., to mine key information hidden in complaints, understand users' emotional tendencies, and grasp users' concentrated concerns about products and services.

## **5.4 Conducting customer satisfaction measurements**

**5.4.1** Measure customer satisfaction and loyalty, track product and service quality, and compare with competitors and benchmarks.

**5.4.2** For different customer groups, such as dealers and end customers, adopt different customer satisfaction and loyalty measurement methods to obtain effective information for improvement.

**5.4.3** Through customer tracking, return visits, etc., timely understand and grasp customer satisfaction with the organization's products and services.

**5.4.4** Through own investigation and research or independent third-party organizations, obtain and apply customer satisfaction information that can be compared with competitors and benchmarks, to identify improvement opportunities, and improve organizational performance.

## **5.5 Determining product requirements**

### **5.5.1 Identifying key requirements**

Based on customer needs, customer complaints and customer satisfaction measurement and analysis results, use tools such as customer relationship management (CRM) and Kano quality model to identify key customer needs. See Appendix B for tools and methods.

### **5.5.2 Transforming key requirements**

- Optimization of test methods. Evaluate the effectiveness, rapidity and economy of test methods, and use this to drive innovation in test methods. Apply tools and methods such as Design of Experiments (DOE), Accelerated Life Test (ALT), and Multi Environment Enhanced Stress Testing (MEOST) to improve the effectiveness and success rate of test method innovation. See Appendix B for tools and methods.
- Adjustment of test methods. Combined with the test requirements and product characteristics, adopt methods such as full inspection and stricter special tests to tighten control.

### **6.3.2 Improving test capabilities**

Adopt professional technology application, function and resource integration, process optimization and re-engineering, statistical process control (SPC) technology application, process control plan (PCP) optimization and other methods, apply automation technology, and develop and improve test equipment from aspects such as improving accuracy, efficiency, and stability.

### **6.3.3 Improving test execution capabilities**

Apply information technology to refine inspection operation guidance requirements and strengthen job skills training.

## **6.4 Test control**

### **6.4.1 Test execution**

Apply test technology to carry out inspection work on products or key components, and effectively isolate unqualified products.

### **6.4.2 Effect verification**

Conduct inspections based on test execution status and product requirement fulfillment.

## **7 Failure mechanism analysis**

### **7.1 General**

Conduct failure analysis on products or parts that do not meet customer needs, study and determine their failure mechanisms, and comprehensively identify potential risks in the entire process of R&D, procurement, manufacturing, as well as sales and service.

### **7.2 Confirming failure mechanism**

#### **7.2.1 Establishing a platform**

Integrate internal and external resources, establish a comprehensive test platform for failure analysis, and ensure the systematic development of failure analysis through resource investment.

### **7.2.2 Analyzing failure cause**

Apply tools and methods such as fault tree analysis (FAT), failure mode and effect analysis, as well as 5WH to analyze the root causes and mechanisms of failures.

### **7.2.3 Confirming failure mechanism**

For products complained by customers and substandard products found during inspection, focus on analyzing the failure phenomenon from various aspects such as materials, structures, limit comparisons, simulation analysis, and multi environment enhanced stress testing (MEOST) to find the root cause of the failure.

## **7.3 Identification of potential risks throughout the entire process**

### **7.3.1 R&D process**

Find the causes of potential risks throughout the product development process, focusing on checking the rationality of design standards and the effectiveness of design review processes.

### **7.3.2 Procurement process**

Check the causes of potential risks from the aspects of parts supplier selection, supplier production process, factory inspection process and storage process, including but not limited to review of supplier quality assurance system, rationality assessment of parts inspection standards, etc.

### **7.3.3 Manufacturing process**

Look for potential risks from the aspects of people, machines, materials, methods, environment, and testing in the product manufacturing process, focusing on the rationality of process standards, equipment accuracy and stability, employee skills and execution, and POKA-YOKE effectiveness, etc.

### **7.3.4 Sales and service process**

Check potential risks from the transportation, installation and service processes, focusing on the standardization of the logistics transportation process, installation process and after-sales service process.

### **8.3.4 Sales and service process**

Apply information technology to strengthen product fault diagnosis and prediction, and implement real-time monitoring and closed-loop management of the sales and service process.

## **8.4 Quality technology innovation**

### **8.4.1 Formation of standards**

Summarize the results of test technology-driven links and system optimization to form technical standards and management standards focusing on inspection standards, charts, and design requirements.

### **8.4.2 R&D and application of supporting software and hardware**

Apply informatization, automation and other intelligent manufacturing technologies to realize the upgrading of supporting software and hardware in the production process.

## **9 System guarantee and effect evaluation**

### **9.1 System guarantee**

In order to effectively implement the quality technology innovation cycle, organizations can consider the following elements when establishing a quality management system:

- Establishing five supporting elements of objective management, organization system, technology system, standard system and information system;
- Taking the R&D process, procurement process, manufacturing process, and sales and service process as the main process elements;
- Taking the quality technology innovation cycle as the core.

See Appendix C for establishing a quality management system with the quality technology innovation cycle as the core.

### **9.2 Effect evaluation**

Apply quality technology innovation cycle to improve quality technology level, and gradually carry out quality improvement projects. Application maturity can be evaluated from five aspects: customer orientation, test technology drive, failure mechanism analysis, process system optimization and benefits. Refer to Appendix D for the specific scoring terms and evaluation elements of the quality technology innovation cycle items.

## Appendix A

(Normative)

### Correlations between various links in the quality technology innovation cycle

The quality technology innovation cycle is further summarized on the basis of the D-CTFP quality innovation cycle that is mature in enterprise application and has significant effects. The correlations between each link are shown in Figure A.1, and the specific relationship is as follows:

- a) The four links of customer orientation, test technology drive, failure mechanism analysis and process system optimization are continuously cycled to achieve continuous innovation in quality technology.
- b) In the customer orientation link, determine product requirements that the organization can understand by understanding customer needs, analyzing customer complaints and conducting customer satisfaction measurements.
- c) In the test technology drive link, convert product requirements into test requirements for products or parts, and improve the test technology to effectively conduct test control and quickly identify and isolate products that do not meet customer needs.
- d) In the failure mechanism analysis link, study and determine the failure causes of non-conforming products, and identify potential risks in the entire process. In this process, the determination of the failure mechanism can promote the improvement of test technology in some cases.
- e) In the process system optimization link, combined with the failure mechanism and potential risks of the entire process, implement special improvements and system optimization to achieve quality technology innovation.
- f) The output of the quality technology innovation cycle is quality technology innovation. After achieving quality technology innovation, further attention shall be paid to customer needs, and a new cycle shall be started, to achieve continuous innovation in quality technology.

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